

Conference Paper

Factors that are Strongly Associated with Student Learning Outcomes and their Policy Implications

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Abstract.

For the first time in 2022, the Indonesian Ministry of Education and Culture issued a comprehensive report, namely the 'Education Report Card.' This report card describes the performance of education at schools and the local governments. This study aims to determine the differences in student learning outcomes based on school characteristics, the differences in school characteristics with different performances, and the factors that are strongly correlated with student learning outcomes. This research is quantitative with a correlational type. A total sample of 440 schools spread across 5 regencies in Central Java Province whose data comes from the year 2022 education report card for basic education level, was used in this study. The statistical analysis used is non-parametric with the Mann-Whitney and Kruskal Wallis difference test and the Spearman correlation test. The results showed that there were significant differences in student learning outcomes based on the type of school, and the status of the school, but not for the type of regencies; there were significant differences in teacher characteristics, learning processes, management processes, and school climate; and factors strongly related with student learning outcomes are the quality of the learning process, the quality of school management, and school climate. The implication of the results of this study is used as the basis for preparing education policy to improve the quality of education by local governments and improving weak educational inputs and processes.

Keywords: education inputs; learning process; process management; educational performance; education report

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1. Introduction

PISA results show that Indonesian students are performing about three years behind the OECD average. More than 50% of fifteen-years old in Indonesia do not master basic reading or math skills. Then Indonesia's top priority is to improve learning outcomes and build core skills and understanding (1). This is in accordance with the education report card issued by the Government of Indonesia which shows that the majority of Indonesian students' literacy and numeracy abilities are below the minimum competency.

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For the first time, the Ministry of Education, Culture, Research and Technology of the Republic of Indonesia released an education report card. The education report card was released in early April 2022 which can be accessed via <https://raporpendidikan.kemdikbud.go.id/app>. This education report card describes the performance of schools and local governments. Based on the education report card, it can be known what factors or variables are strongly and significantly related to student learning outcomes.

The education report card consists of three dimensions, namely educational output dimension, process dimension, and input dimension. The education output dimension consists of three indicators, namely the achievement of student literacy skills, the achievement of student numeracy skills, and student character. On this research, the process dimension consists of the learning quality index, the teacher reflection index, and the principal's instructional leadership. The education input dimension consists of the proportion of teachers who have educator certificates, teacher training experience, teacher competency test scores, teacher sufficiency, and school climate (school safety climate, gender equality climate, diversity climate, and inclusiveness climate).

Previous studies have shown that student learning outcomes are influenced by many variables. Educational output can be influenced by teacher factors (2), (3), (4), (5), (6), and (7). Other studies say that educational output is influenced by principals (8) and (9). Other studies say that educational output is influenced by school climate (8), (9), (10), (11), (12), and (13). Educational output is also influenced by community participation (8) and (9).

The results of those studies show that there is a positive and significant relationship between educational inputs and educational outputs or there was a positive and significant relationship between the educational process and educational output. Other result shown that there is no positive and significant relationship. There are inconsistencies in the results of previous studies, so it is interesting to investigate further. Generally, the previous research was in the framework of a small and limited population and sample, while this study included a large population and sample framework. In addition, no previous research has used comprehensive data such as education report cards sourced from various types of assessments.

This study aims to determine the variables that are the main determinants of educational output. In detail, this study aims to determine: (1) the differences of student learning outcomes based on school type, school status, and type of area, (2) the differences of the characteristics of input, process, and school output based on different performances, (3) the factors that are strongly correlated with student learning outcomes.

2. Method

This research is a quantitative type with a descriptive and correlational design. The data was processed from education report cards in 5 Tanoto Foundation partner districts/cities in Central Java Province, namely Banyumas Regency, Cilacap Regency, Kendal Regency, Tegal Regency, and Semarang City. The total number of basic education units that include equivalent elementary schools and equivalent junior high schools in the 5 regions is obtained from the basic education data (Dapodik) at <https://dapodik.kemdikbud.go.id/sp/1/030000> as many as 5,742 schools. Of these, 5,589 schools or 97% have had education report cards. The sample of this analysis was taken from 4% of schools with the lowest output or performance as many as 229 schools and 4% schools with the highest output or performance as many as 211 schools with details in table 1.

Criteria	Status of School		Total	Percentage
	Public	Private		
Very Low & Low	45	184	229	4%
Medium	1487	901	2388	43%
High	1976	785	2761	49%
Very High	112	99	211	4%
Grand Total	3620	1969	5589	100%

Figure 1: Total Sample According to Education Output Criteria.

If viewed from the type of school and school status, the distribution of the sample schools with the lowest performance schools with the highest performance will be shown in table 2.

Type of Schools	Status of Schools		Total
	Public	Private	
Elementary Schools	19	53	72
Madrasah Ibtidaiyah	0	8	8
Junior High Schools	81	231	312
Madrasah Tsanawiyah	3	45	48
Grand Total	103	337	440

Figure 2: Type and Status of School in the Worst and Best School.

Education report cards which originally contained qualitative data were changed to quantitative ones. So the type of data in this study is classified as nominal and ordinal. The variable that has nominal data is the type of school, namely Elementary School equivalent quantified 1, Madrasah Ibtidaiyah equivalent quantified 2, Junior High School equivalent quantified 3, and Madrasah Tsanawiyah equivalent quantified 4. In the same way of quantification, another type of data that includes nominal is school status namely public and private. Regional types are also nominal, namely Banyumas Regency, Cilacap Regency, Kendal Regency, Tegal Regency, and Semarang City.

While the data classified as ordinal are in the dimensions of education output, namely literacy skills, numeracy abilities, and student character. Examples of quantification of numeracy and literacy abilities of students with 5 categories, namely data not yet available or insufficient data given a quantification number 0, far below the minimum competence with quantification 1, below the minimum competence with quantification 2, meeting the minimum competence with code 3, and exceeding competence minimum with code 4. With the same quantification model given the dimensions of educational input and dimensions of the educational process.

The types of data in this study include nominal and ordinal, so the statistics used are nonparametric statistics. The hypothesis test used is the Mann-Whitney difference test with an alpha of 0.05% and the Kruskal Wallis difference test with an alpha of 0.05%. Test the correlation between variables using the Spearman test with an alpha of 0.01%. Hypothesis testing using SPSS version 24 program.

3. Result and Discussion

3.1. Results

a. Differences In Student Learning Outcomes Based on School Characteristics

The average rank of students' literacy abilities was highest in the type of education, Junior High School 240, followed by Madrasah Tsanawiyah 225, and Elementary School and Madrasah Ibtidaiyah with the same score, namely 144. The literacy ability of students according to the type of education had a significant difference as evidenced by the sig 0, level. $00 < 0.05$.

In numeracy skills, the highest average ranking of students' numeracy abilities was in Junior High School 239, then Madrasah Tsanawiyah 229, and Elementary School

and Madrasah Tsanawiyah with the same score of 144. There was a significant difference in students' abilities according to the type of education indicated by the level of significance $0.00 < 0.05$.

The highest average student character score was obtained by Junior High School 239, followed by Madrasah Tsanawiyah 228, and the same score was 143 at Elementary School and Madrasah Tsanawiyah. There was a significant difference in the character of students according to the type of education with a proven significance of $0.00 < 0.05$. More details can be seen in table 3.

Type of School	N	A1. Literacy Ability			A2. Numeracy Ability			A3. Character		
		Mean	Chi-Square	Asymp. Sig.	Mean	Chi-Square	Asymp. Sig.	Mean	Chi-Square	Asymp. Sig.
Elementary School	72	143.50	52.55	0.00	143.50	50.84	0.00	143.00	52.79	0.00
Madrasah Tsanawiyah	8	143.50			143.50			143.00		
Junior High School	312	239.51			239.93			239.27		
Madrasah Tsanawiyah	48	225.10			229.06			227.64		
Total	440									

Figure 3: Student Ability Based on Type of Schools.

Student learning outcomes in the form of student literacy skills also have significant differences as evidenced by a significance of $0.00 < 0.05$. The average rating of public schools is 303 higher than private schools 195. In numeration output there is also a significant difference between public and private schools with a significance of $0.00 < 0.05$. The numeracy skills of public-school students are 299 higher than private schools 196. The character of public-school students with a score of 303 is higher than that of private schools 195 and there is a significant difference with a significance of $0.00 < 0.05$ as shown in table 4.

Status of School	N	A1. Literacy Ability			A2. Numeracy Ability			A3. Character		
		Mean	Chi-Square	Asymp. Sig.	Mean	Chi-Square	Asymp. Sig.	Mean	Chi-Square	Asymp. Sig.
Public	160	303.27	8806.530	0.000	299.59	3240.600	0.000	309.89	8807.000	0.000
Private	277	195.20			196.12			195.31		
Total	437									

Figure 4: Student Ability Based on Status of Schools.

When compared between the 5 regions studied, there was no significant difference as indicated by a significance level of $0.10 > 0.05$. However, it can be seen that the highest average literacy ability score is in Semarang City 229 and the lowest is in Tegal Regency with a score of 186. The highest numeracy ability is in Semarang City and Banyumas Regency as high as 230 and the lowest in Tegal Regency with a score of 189. The best student character is in Banyumas Regency 229 and the lowest character is in Tegal Regency with a score of 188. More details can be seen in table 5.

b. Differences In School Characteristics of Different Performances

Type of District	N	A1. Literacy Ability			A2. Numeracy Ability			A3. Character		
		Mean Rank	Chi Square	Asymp. Sig. (2-tailed)	Mean Rank	Chi Square	Asymp. Sig. (2-tailed)	Mean Rank	Chi Square	Asymp. Sig. (2-tailed)
Esungun District	9	228.03	8.079	0.089	220.65	7.535	0.020	237.56	7.079	0.151
Gekepe District	83	223.55			217.55			223.61		
Kandol District	41	237.02			237.66			238.27		
Temi District	52	185.49			188.91			187.67		
Saramang City	70	229.18			240.19			228.69		
Total	40									

Kruskal-Wallis Test. Sig. 0.05

Figure 5: Student Ability Based on Type of District.

When comparing student learning outcomes in schools with the lowest and highest performance, it is clear that there is a positive and significant difference because $0.00 < 0.05$. The literacy, numeracy, and character abilities of students in the lowest performing schools scored 150, or 50% lower than the students' abilities in the highest performing schools with a score of 370. This can be seen in table 6.

Output Quality	N	A1. Literacy Ability			A2. Numeracy Ability			A3. Character		
		Mean Rank	Wilcoxon W	Asymp. Sig. (2-tailed)	Mean Rank	Wilcoxon W	Asymp. Sig. (2-tailed)	Mean Rank	Wilcoxon W	Asymp. Sig. (2-tailed)
Worst	298	149.50	44551	0.00	149.50	44551	0.00	149.50	44551	0.00
Best	102	369.50			369.50			369.50		
Total	400									

Mann-Whitney Test

Figure 6: Student Ability based on Output Quality.

Judging from the input of teachers in schools with the lowest performance compared to schools with the highest performance, there is a positive and significant difference, which is shown by sig. $0.00 < 0.05$. The proportion of teachers who are certified educators in the schools with the lowest performance scores 182 which is much lower than the schools with the highest performance of 301. The experience of teacher training in the schools with the lowest performance with a score of 194 is also lower than the schools with the highest performance which scores a score of 297. The results of the teacher competency test in the school with the lowest performance scored 180 lower than the score 307 in the school with the highest performance. Teacher input data can be seen in table 7.

Output Quality	N	C1. Proportion of Certified			C2. Teacher training			C3. Teacher competency test			C4. Teaching Sufficiency		
		Mean Rank	Mann-Whitney U	Asymp. Sig. (2-tailed)	Mean Rank	Mann-Whitney U	Asymp. Sig. (2-tailed)	Mean Rank	Mann-Whitney U	Asymp. Sig. (2-tailed)	Mean Rank	Mann-Whitney U	Asymp. Sig. (2-tailed)
Worst	298	82.07	976.00	0.00	181.29	1087.00	0.00	75.52	89.640	0.00	181.35	12.7090	0.00
Best	102	301.18			296.49			307.50			281.68		
Total	400												

Mann-Whitney Test. Sig. 0.05

Figure 7: Teacher Input based on Output Quality.

The quality of teacher input is grouped into four quartiles with quartile 4 being the lowest quality and quartile 1 being the highest quality. Based on this grouping, it is known that each indicator of teacher input in schools with the lowest quality is dominated by teachers who are in quartile 4. Meanwhile in schools with the highest quality, the quality of teacher input is dominated by teachers who are in quartile 1. In schools with the lowest performance, the condition of teacher input is dominated by quality in quartile 4, while in schools with the highest performance it is partially dominated by quartile 1.

In this study, the learning process is grouped into 3 indicators, namely the learning quality index, teacher reflection index, and instructional leadership. In these three indicators, there is a positive and significant difference between schools with the lowest performance compared to schools with the highest performance, which is indicated by sig 0.00 < 0.05. The quality index of the learning process in schools with the highest performance is 2.5 times better than the schools with the lowest performance. The teacher's reflection index in teaching in schools with the highest performance is 2.4 times better than the school with the lowest performance. Likewise, the principal's instructional leadership in schools with the highest performance was 2.4 times better than in schools with the lowest performance. More details can be seen in table 8.

Output Quality	N	D1. Learning Quality Index			D2. Teacher Reflection Index			D3. Instructional Leadership		
		Mean Rank	Mann-Whitney U	Asymp. Sig. (2-tailed)	Mean Rank	Mann-Whitney U	Asymp. Sig. (2-tailed)	Mean Rank	Mann-Whitney U	Asymp. Sig. (2-tailed)
Worst	298	12006	12006	0.00	12042	27500	0.00	1573	14120	0.00
Best	12	3684			767.66			365.86		
Total	310									

Mann-Whitney Test

Figure 8: Learning Process based on Output Quality.

The quality of the learning process is also grouped into four quartiles. Quartile 4 is the lowest quality while quartile 1 is the highest quality. The results show that each indicator of the learning process in schools with the lowest performance is dominated by the learning process in quartile 4. Meanwhile, in schools with the highest performance, the learning process is dominated by the learning process in quartile 1.

There are positive and significant differences in all school climate indicators between schools with the lowest performance compared to schools with the highest performance as evidenced by the sig level. 0.00<0.05. The four school climate indicators, namely school safety climate, gender equality climate, diversity climate, and inclusiveness climate in schools with the highest performance are 2.4 times greater than schools with the lowest performance. This can be seen in table 9.

Output Quality	N	D1. School safety climate			D6. Gender Equality Climate			D8. Diversity Climate			D10. Inclusivity Climate		
		Mean	Standa. Dev.	Skewness	Mean	Standa. Dev.	Skewness	Mean	Standa. Dev.	Skewness	Mean	Standa. Dev.	Skewness
		Bar	White-T	2-tailed	Bar	White-T	2-tailed	Bar	White-T	2-tailed	Bar	White-T	2-tailed
Read	298	130.53	36.06	0.00	130.39	34.52	0.00	130.22	38.52	0.25	130.22	38.25	0.30
Res	29	167.75			167.75			167.75			167.75		
Total	327												

Mean & Empty Cells (% of total):

Figure 9: School Climate based on Output Quality.

If the four school climates are grouped into four quartiles, with quartile 1 being the best and quartile 4 being the lowest, the majority of schools with the lowest performance are in quartile 4 while the schools with the highest performance are mostly in quartile 1.

c. Factors That Are Strongly Correlated to Student Learning Outcomes

Of all the factors or input variables and the process, spearman correlation is carried out and the results are shown in table 12. By using the correlation criteria of the Guilford model (1956) quoted (14) as stated in table 13, there are only two correlation criteria are medium and very high.

All as Input Variables (Spearman's rho, 0.01)	A1. Literacy Ability		A2. Numeracy Ability		A3. Character	
	Correlation Coefficient	Sig. (2-tailed)	Correlation Coefficient	Sig. (2-tailed)	Correlation Coefficient	Sig. (2-tailed)
C1. Proportion of Certified Teachers	.440**	0.000	.433**	0.000	.453**	0.000
C3. Teacher training experience	.439**	0.000	.434**	0.000	.445**	0.000
C5. Teacher competency test scores	.470**	0.000	.478**	0.000	.489**	0.000
C8. Teacher Adequacy	.480**	0.000	.456**	0.000	.532**	0.000
D1. Learning Quality Index	.384**	0.000	.371**	0.000	.381**	0.000
D3. Teacher Reflection Index	.376**	0.000	.368**	0.000	.378**	0.000
D4. Instructional Leadership	.379**	0.000	.366**	0.000	.370**	0.000
D4. School safety climate	.380**	0.000	.378**	0.000	.387**	0.000
D6. Gender Equality Climate	.372**	0.000	.367**	0.000	.374**	0.000
D8. Diversity Climate	.386**	0.000	.375**	0.000	.381**	0.000
D10. Inclusivity Climate	.383**	0.000	.377**	0.000	.383**	0.000
E1. School community participation	.379**	0.000	.376**	0.000	.370**	0.000
E3. Utilization of ICT for budgeting	.471**	0.000	.465**	0.000	.489**	0.000

** Correlation is significant at the 0.01 level (2-tailed).

Figure 10: Correlation of Input to Output of Education.

Factors that have a very high correlation to literacy, numeracy, and student character are the variables of the learning quality index, teacher reflection index, principal's instructional leadership, school security climate, gender equality climate, diversity climate, inclusiveness climate, and school community participation.

While the factors that have a moderate relationship with literacy, numeracy, and student character are the variables of the proportion of certified teachers, teacher training experience, teacher competency test scores, teacher adequacy, and the use of information and communication technology for school budgeting.

Correlation coefficient	Meaning of Correlation
$0.9 \leq r \leq 1$	Very High
$0.7 \leq r < 0.9$	High
$0.4 \leq r < 0.7$	Medium
$0.3 \leq r < 0.4$	Low
$r < 0.3$	Very Low

Figure 11: Correlation Coefficient Criteria.

3.2. Discussion

a. Differences In Student Learning Outcomes Based on School Characteristics

The results of this study indicate that student learning outcomes in madrasas are lower than student learning outcomes in schools. The results of another study showed that the reading ability of Madrasah Ibtidaiyah students was as good as the reading ability of elementary school students (15). Meanwhile research at the Junior High School and Madrasah Tsanawiyah levels shows that in mathematics the average value of Junior High School mathematics is higher than that of Madrasah Tsanawiyah students (16). The results of this study and other studies show that it is inconsistent that the learning outcomes of madrasa students are not always lower than students in schools.

The results of this study indicate that public school students' learning outcomes are better than private schools. The results of other studies show that the problem-solving abilities of public elementary school students are better than the problem-solving abilities of private elementary school students (17). Another study comparing student learning outcomes based on national mathematics test scores in public and private junior high schools showed no significant differences (18). This means that the quality of student learning outcomes in public education units compared to private ones is inconsistent or controversy occurs.

The results of this study indicate that the character of students in public schools is better than the character of private schools. This is in line with the results of other studies which show that student learning outcomes on character indicators in private schools are lower than public education units (19). The cause of the delay in the implementation of character education in private schools is the diverse characteristics of students and the complexity of the problems (20). Private schools have very diverse characteristics, both from the background of the educational unit, social background,

economy, culture, and parental beliefs. The results of other studies show that the planning and implementation of character education in private schools adjusts to the wishes of the stakeholders (21).

There is no significant difference in school performance in the city and district areas, although the performance score of Semarang City tends to be higher than the other four districts. However, the results of other studies show that currently there is a gap in the availability of educator workforce inputs, inputs for infrastructure, and inputs for education funding in rural areas, this results in inequality in the quality of education (22).

b. Differences In School Characteristics with Different Performances

The results of this study indicate that the input of teachers in the schools with the lowest performance is dominated by the teachers with the lowest quality, on the contrary, the schools with the highest performance have most of the teacher inputs are also the best. This is in line with previous research that the condition of the teacher has a major influence on student learning outcomes. Based on a study, the influence of teachers on student learning outcomes reached 30% (23).

The quality of the learning process in schools with the lowest performance is dominated by the quality of the lowest learning process, namely in quartile 4, while the school with the best performance is dominated by the highest learning process, namely in quartile 1. This is in line with the results of previous studies which stated that student learning outcomes were inadequate in primary and secondary education in Indonesia, one of the main causes is related to the quality of teachers. Among them is the low competence of teachers because the teacher competency score is only 57 out of 100. Another cause is the ineffectiveness of teachers in teaching because 90% of the questions asked by teachers are shallow questions and rarely involve high-level analytical skills (6).

This is in line with the following research results. The application of good classroom management has an effect on student achievement (3) and (4). Teachers' affective support for students also affects students' mathematics learning achievement (5). The practical learning method also has a significant effect on students' learning motivation and learning outcomes (7).

There is a fairly strong correlation between educational inputs and outputs, besides the learning quality index, the school climate includes a climate of school safety, a climate of diversity, and a climate of inclusivity. School climate or specifically called learning environment climate is closely related to student learning outcomes. The results of this study are in accordance with the results of other studies which show that the

learning environment has a positive relationship to student achievement, as well as the learning process has a positive and significant relationship to student achievement (10). Other studies also state that a good school climate and school facilities have a positive effect on student achievement (11). Other evidence suggests a relationship between school climate and student achievement (12). Based on 90 studies with a sample size of 148,504 subjects, it shows that the school climate has a positive effect on student achievement (13).

c. Factors That Are Strongly Correlated to Student Learning Outcomes

The factors that are highly correlated with school performance are indicators of the learning process, indicators of school management, indicators of school climate, and indicators of school community participation. The first three indicators have been discussed in the section on differences in school characteristics with different performances (section b). Meanwhile, indicators that have a weak relationship do not need to be discussed in this article.

So in this section, we will discuss the factor of school community participation or community participation which in this study has a very strong relationship to school performance. Other research shows that there are nine characteristics that are found most often in high-performing schools, one of which is a high level of family and community involvement (8). The same thing was found in another study which stated that one of the characteristics of a strong school is having a wide community network and partnerships with local organizations (9). This means that this research is in line with the results of previous studies.

4. Conclusion

The first conclusion is that elementary school performance is better than Madrasah Ibtidaiyah. Junior high school performance is better than Madrasah Tsanawiyah. Public schools perform better than private schools. It is suggested to the Ministry of Religion and private school administrators, namely the Foundation, to pay more attention to the quality of the schools they manage so that they catch up with the schools managed by the Education Office. There was no significant difference in students' abilities based on the comparison between the five areas studied.

The second conclusion is that the school with the lowest performance has a low score on teacher input, learning processes, management processes, and school climate. Therefore, it is recommended that school managers, namely the Government, Regional

Governments, and Foundations, should increase teacher input in the lowest performing schools by increasing the number of teachers, increasing competence, increasing the number of certified teachers, and providing training to teachers to increase their training experience. Thus, the learning process, school management, and school climate become better. Teacher professional organizations and teacher learning communities are also expected to be active in encouraging the improvement of the quality of teacher input, the quality of the learning process, the quality of school management, and the school climate.

The third conclusion is that the factors or variables that are highly correlated with school performance are indicators of the learning process and management, school climate, and school community participation. Therefore, it is appropriate for the Government, Regional Government, and Foundations to prioritize designing learning experiences and training for teachers and principals well.

The policy implication of this research is that the Government and local government are expected to include policies in order to improve the competence of teachers and principals by designing further education, education and training, as well as apprenticeships from the lowest performing schools to the highest performing schools.

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